

AMENDMENTS TO THE CLAIMS

Claims 1-25. (Canceled)

26. (Currently Amended) A method of operating a microcavity discharge device, said method comprising the steps of:

supplying an electrical current to excite a discharge gas located within said device, said electrical current including a constant direct current and a pulsed current; and

emitting radiation produced by said excited discharge gas through a closed end of said microcavity discharge device.

27. (Original) The method of claim 26, wherein said radiation has a wavelength that is less than 100 nanometers.

28. (Original) The method of claim 26, wherein said emitting step includes emitting radiation through a metal.

29. (Original) The method of claim 26, further comprising the step of supplying said constant direct current at a voltage of approximately 220 Volts.

30. (Original) The method of claim 29, further comprising the step of supplying said constant direct current in the range of approximately 1 to 3 milliamps.

31. (Original) The method of claim 29, further comprising the step of supplying said pulsed current in the range of approximately 60 to 100 amps.

32. (Currently Amended) The method of claim 26, ~~further comprising~~ wherein the step of supplying said pulsed current comprises applying a pulsed current, each pulse with a duration of approximately 1×10^{-6} seconds or less.

33. (Currently Amended) The method of claim 26, ~~further comprising wherein~~ the ~~steps~~ step of supplying said pulse current comprises applying a pulsed current at a rate up to approximately 1000 pulses per second.

34. (Currently Amended) The method of claim 26, ~~further comprising wherein~~ the ~~steps~~ step of supplying said pulse current comprises spacing said pulse current at approximately 0.001 seconds or greater.

Claims 35-38. (Canceled)

39. (New) A method of operating a lithography system, the method comprising:

supplying an electric current to a discharge gas located within a pressure system comprising a microcavity discharge device, said electric current comprising a constant direct current and a pulsed current;

emitting radiation through a closed end of said microcavity device; and

deflecting an optical path of the emitted radiation to a wafer.

40. (New) The method of claim 39, wherein the step of deflecting the path of the emitted radiation comprises reflecting said radiation from at least one mirror.

41. (New) The method of claim 40, wherein a reflecting surface of said at least one mirror is coated with one of molybdenum silicon (MoSi) and molybdenum beryllium (MoBe) compounds.

42. (New) The method of claim 41, wherein said compounds have a peak normal incidence reflectiveness of approximately 70% within a reflectivity bandwidth of approximately 1 nanometer.

43. (New) The method of claim 41, wherein said reflecting surface of said at least one mirror is coated with multiple layers of MoSi.

44. (New) The method of claim 39, wherein the step of deflecting said emitted radiation to a wafer comprises reflecting the radiation through at least one of a mask and a reticle.

45. (New) The method of claim 39, further comprising the step of attaching a substrate having an aperture to the closed end of said microcavity discharge device, the substrate aligned with the discharge device so that the radiation is emitted out through the aperture.

46. (New) The method of claim 45, wherein said aperture in said substrate has sloped sidewalls, the sloped sidewalls acting to direct the emitted radiation.

47. (New) The method of claim 39, further comprising the step of mounting the wafer on a wafer station.

48. (New) The method of claim 47, wherein said wafer is mounted on a mobile wafer transport station.

49. (New) The method of claim 48, wherein the step of emitting radiation comprises transmitting said radiation across a system perimeter while said wafer is mobile on said wafer station.

50. (New) The method of claim 39, further comprising the step of configuring said lithography station to prevent atmospheric contamination and refraction of said emitted radiation.

51. (New) A method of exposing photoresist on a wafer, the method comprising:

supplying a discharge gas into an open end of a microcavity discharge device located within a pressure system;

supplying an electric current to said discharge device, said electric current including a constant direct current and a pulsed current;

emitting radiation through a closed end of said microcavity device; and

reflecting said emitted radiation from at least one optical mirror, said optical mirror reflecting said radiation to the wafer through openings in a patterned device, said radiation applied to said wafer effectively exposing said photoresist on said wafer.

52. (New) The method of claim 51, wherein said wafer includes an integrated circuit, said method comprising exposing said photoresist during integrated circuit fabrication.

53. (New) The method of claim 51, wherein said patterned device comprises at least one of a mask and a reticle.

54. (New) A method of forming a radiation emitting device, the method comprising:

forming an insulating layer over a semiconductor plug;

forming an anode layer over said insulating layer; and

forming a cavity having a pre-determined diameter through the anode and insulating layers and to a pre-determined depth in the semiconductor plug thereby creating one open end and one closed end,

said device being adapted to receive a discharge gas through said open end and adapted to discharge radiation through said closed end.

55. (New) The method of claim 54, wherein the step of forming an insulating layer comprises depositing one of either silicon dioxide or aluminum oxide over said semiconductor plug.

56. (New) The method of claim 54, wherein the anode layer comprises one of either a metal or a doped polysilicon.

57. (New) The method of claim 56, wherein the anode layer is deposited to a thickness of about 4 to about 20 microns.

58. (New) The method of claim 56, wherein the anode layer comprises any one of copper, gold, tungsten, aluminum, silver, doped silicon, nickel, and chromium.

59. (New) The method of claim 54, wherein the step of forming a cavity comprises one of etching and drilling.

60. (New) The method of claim 59, wherein the step of forming a cavity comprises forming a cavity having a substantially cylindrical shape.

61. (New) The method of claim 60, wherein the cavity has a pre-determined diameter of less than approximately 120 microns.

62. (New) The method of claim 61, wherein the pre-determined diameter is in the range of about 10 to about 120 microns.

63. (New) The method of claim 59, wherein the predetermined depth is in the range of about 20 to about 100 microns.

64. (New) The method of claim 59, wherein the step of forming a cavity comprises forming a cavity to a depth of about 0.2 to about 0.8 microns above the closed end of said semiconductor plug.

65. (New) The method of claim 54, wherein the discharge gas comprises xenon.

66. (New) The method of claim 54, wherein said discharge device is adapted to receive a discharge gas at a pressure of about 200 torr to about 600 torr.

67. (New) The method of claim 54, further comprising the step of coupling said anode layer and said closed end to an electrical source.

68. (New) A method of forming a radiation discharging device, the method comprising:

forming an insulating layer over one end of a semiconductor plug;

forming an anode layer over said insulating layer;

attaching a metal layer to an opposite end of said semiconductor plug; and

forming a cavity having a pre-determined diameter from an exposed top surface of the anode layer down to a top surface of the metal layer thereby creating one open end and one closed end of said device; wherein said open end is adapted to receive a pressurized discharge gas and said closed end is capable of emitting radiation.

69. (New) The method of claim 68, wherein the step of attaching a metal layer to an opposite end of said plug comprises growing a metal film on said end of said plug to a thickness of about 0.2 to 0.8 microns.

70. (New) The method of claim 69, wherein the metal film comprises beryllium.

71. (New) The method of claim 68, wherein the step of attaching said metal layer to an opposite end of said semiconductor plug comprises utilizing an epoxy to secure said metal layer to said semiconductor plug.

72. (New) The method of claim 68, further comprising the step of coupling said anode layer and said semiconductor plug to an electrical source.

73. (New) A method of operating a microcavity device comprising:

supplying a discharge gas to an open end of a microcavity device; and

causing said discharge gas to emit radiation with a wavelength of less than 100 nanometers through a closed end of said device.

74. (New) The method of claim 73, further comprising the step of applying an electrical current to said discharge gas, said current comprising a constant direct current and a pulsed current.

75. (New) The method of claim 74, wherein the step of supplying said electrical current comprises applying a pulsed current at a rate of up to approximately 1000 pulses per second.

76. (New) The method of claim 73, further comprising the step of reflecting said emitted radiation onto a wafer.

77. (New) The method of claim 76, wherein the step of reflecting said emitted radiation comprises reflecting said radiation from a reflective surface of a first optical mirror to at least a second optical mirror, said second optical mirror reflecting said radiation to said wafer.